DAYLIGHT & SUNLIGHT

AMENITY WITHIN THE SITE

RMG Mount Pleasant

13 February 2018

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1 EXECUTIVE SUMMARY & INTRODUCTION

1.1 EXECUTIVE SUMMARY

The purpose of this report is to ascertain if the proposed removal of one core within Plot A of the consented Mount Pleasant development will have an impact on the daylight and sunlight amenity within the proposed residential accommodation.

The results of the daylight and sunlight assessments undertaken demonstrate that the proposed units will still offer acceptable daylight and sunlight amenity. Where daylight and sunlight levels lower than those recommended are achieved, this is mainly due to the presence of balconies, which inherently restrict the sky visibility from the rooms below or behind them, and the courtyard arrangement of this plot.

The proposed removal of one core is therefore not considered to have a material impact on the daylight and sunlight amenity provided within the proposed units.

Further details can be found in Section 5 of this report.

1.2 INTRODUCTION AND OBJECTIVE

GIA has been instructed to provide a report upon the potential availability of Daylight and Sunlight to the proposed accommodation within the residential scheme prepared by Broadway Malyan. GIA was specifically instructed to carry out the following:

- To create a 3D computer model of the proposal based upon drawings prepared by Broadway Malyan.
- Carry out a daylight assessment using the methodologies set out in the BRE guidance for Average Daylight Factor, No-Sky Line and Room Depth Criterion.
- Carry out a sunlight assessment using the methodologies set out in the BRE guidance for Annual Probable Sunlight Hours (APSH) to the fenestration facing within 90° of due south.
- Prepare a report setting out the analysis and our findings.

2 PLANNING POLICY CONTEXT

2.1 NATIONAL PLANNING POLICY

National Planning Policy Framework (2012)

The National Planning Policy Framework was adopted on the 27th March 2012 and paragraph 17 stipulates that *"...planning policies and decisions should always seek to secure a good standard of amenity for existing and future occupants of land and buildings."*

Planning Practice Guidance (2015)

Paragraph 026 of the Design guidance within the National Planning Practice Guidance states that *"account should be taken of local climatic conditions, including daylight and sunlight".*

2.2 REGIONAL PLANNING POLICY

The Greater London Authority (GLA): The London Plan – Spatial Development Strategy for Greater London Consolidated with Alterations Since 2011 (March 2016)

The key policies from the adopted London Plan of relevance to this assessment are detailed below:

- Policy 7.6, Architecture, states: *"...buildings and structures should...not cause unacceptable harm to the amenity of surrounding land and buildings, particularly residential buildings, in relation to privacy, overshadowing, wind and micro-climate."*
- Policy 7.7, Location and Design of tall and large buildings, notes that large buildings should not adversely affect their surroundings in terms of overshadowing: *"Location and design of tall buildings should not affect their surroundings adversely in terms of microclimate, wind turbulence, overshadowing, noise, reflected glare, aviation, navigation and telecommunication interference."*

GLA: Housing Supplementary Planning Guidance (March 2016)

The SPG draws on the London Plan, primarily the relevant policy 7.6Bd, and provides further guidance on standards to daylight and sunlight.

Paragraph 1.3.45 of the guidance states that *"an appropriate degree of flexibility needs to be applied when using BRE guidelines to assess the daylight and sunlight impacts of new development on surrounding properties, as well as within new developments themselves."*

The paragraph continues *"guidelines should be applied sensitively to higher density development... where BRE advice suggests considering the use of alternative targets' taking in to account the 'local circumstances; the need to optimise housing capacity; and scope for character and form of an area to change over time."*

GLA: Sustainable Design and Construction Supplementary Planning Guidance (2014)

Section 2.3 of the SPG provides guidance on key areas such as site layout and micro-climate in relation to site layout and building design.

With regard to site layout, paragraph 2.3.6 refers to measures to reduce carbon dioxide emissions *"include enabling access to daylight and sunlight for uses that require [light]."* In addition, the guidance states that *"site planning can minimise the impact of the shadow created by the new buildings to protect existing features such as open space and renewable solar technologies on roofs."* It goes on to say that *"developers should ensure the layout of their site and buildings maximises the opportunities provided by natural systems, such as light."*

Paragraph 2.3.8 of the SPG continues with effects on the micro-climate caused by new buildings which include *"overshadowing and reducing access to sunlight."*

The guidance states that the above effects should *"be considered during the design of a development and assessed once the designed is finalised."*

2.3 OTHER RELEVANT GUIDANCE

Historic England: Guidance on Tall Buildings – Historic England Advice Note 4 (2015)

Paragraph 4.10 of the Historic England Advice Note 4 recommends that the following should be addressed in relation to tall buildings:

"consideration of the impact on the local environment, including microclimate, overshadowing, night-time appearance, vehicle movements and the environment and amenity of those in the vicinity of the building".

3 BRE GUIDELINES

The Building Research Establishment (BRE) have set out in their handbook 'Site Layout Planning for Daylight and Sunlight a Guide to Good Practice (2011)', guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings.

The guide also provides advice on site layout planning to determine the quality of daylight and sunlight within open spaces between buildings.

It is important to note, however, that this document is a guide and states that its aim *"is to help rather than constrain the designer"*.

The document provides advice, but also clearly states that it *"is not mandatory and this document should not be seen as an instrument of planning policy."* The report also acknowledges in its introduction that *"in special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."*

It is an inevitable consequence of the built up urban environment that daylight and sunlight will be more limited in these areas. It is well acknowledged that in such situations there may be many other conflicting and potentially more important planning and urban design matters to consider other than just the provision of ideal levels of daylight and sunlight.

3.1 DAYLIGHT

The BRE set out various methods for assessing the daylight within a proposed building within section 2.1 and Appendix C of the handbook. These are summarised below.

Vertical Sky Component (VSC)

This method of assessment can be undertaken using a skylight indicator or a Waldram diagram. It measures from a single point, at the centre of the window (if known at the early design stage), the quantum of sky visible taking into account all external obstructions. Whilst these obstructions can be either other buildings or the general landscape, trees are usually ignored unless they form a continuous or dense belt of obstruction.

The VSC method is a useful 'rule of thumb' but has some significant limitations in determining the true quality of daylight within a proposed building. It does not take into account the size of the window, any reflected light off external obstructions, any reflected light within the room, or the use to which that room is put. Appendix C of the guide goes into more detail on these matters and sets forward alternative methods for assessment to overcome these limitations.

Appendix C of the BRE guide: Interior Daylighting Recommendations, states:

"The British Standard for daylighting, and the CIBSE Applications manual: window design, contain advice and guidance on interior daylighting. This guide to good practice is intended to be used in conjunction with them, and its guidance is intended to fit in with their recommendations.

For skylight, the British Standard and the CIBSE manual put forward three main criteria, based on the average daylight factor, room depth, and the position of the no skyline."

These assessments are set out below.

Average Daylight Factor (ADF)

"If a predominantly daylit appearance is required, then df should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings, of 2% for kitchens, 1.5% for living rooms and 1%

for bedrooms. These last are minimum values of Average Daylight Factor, and should be attained even if a predominantly daylit appearance is not required."

This method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the Vertical Sky Component and the quantum of reflected light off external surfaces.

This is, therefore, a significantly more detailed method of assessment than the Vertical Sky Component method set out above.

Room Depth Criterion (RDC)

Where it has access to daylight from windows in one wall only, the depth of a room can become a factor in determining the quantity of light within it. The BRE guidance provides a simple method for examining the ratio of room depth to window area. However, whilst it does take into account internal surface reflections, this method also has significant limitations in that it does not take into account any obstructions outside the window and therefore draws no input from the quantity of light entering the room.

No Sky Line (NSL)

This third method of assessment is a simple test to establish where within the proposed room the sky will be visible through the windows, taking into account external obstructions. The assessment is undertaken at working plane height (850mm above floor level) and the method of calculation is set out in Appendix D of the BRE handbook.

Appendix C of the BRE handbook states *"if a significant area of the working plane lies beyond the no skyline (i.e., it receives no direct skylight), then the distribution of daylight in the room will look poor and supplementary electric lighting will be required."* To guarantee a satisfactory daylight uniformity, the area which does not receive direct skylight should not exceed 20% of the floor area, as quantified in the BS 8206 Part2 2008.

Summary

The Average Daylight Factor gives a more detailed assessment of the daylight within a room and takes into account the highest number of factors in establishing a quantitative output.

However, the conclusion of Appendix C of the BRE guide states:

"All three of the criteria need to be satisfied if the whole of the room is to look adequately daylit. Even if the amount of daylight in a room (given by the Average Daylight Factor) is sufficient, the overall daylight appearance will be impaired if its distribution is poor."

In most urban areas it is important to recognise that the distribution of daylight within a room may be difficult to achieve, given the built up nature of the environment. Consequently, most local authorities seek to ensure that there is sufficient daylight within the room as determined by the Average Daylight Factor calculation. However, the additional recommendations of the BRE and British Standard for residential accommodation, set out above, ought not to be overlooked.

3.2 SUNLIGHT

The BRE provide guidance in respect of sunlight quality for new developments within section 3.1 of the handbook. It is generally acknowledged that the presence of sunlight is more significant in residential accommodation than it is in commercial properties, and this is reflected in the BRE document.

It states, *"in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon."*

The BRE guide considers the critical aspects of orientation and overshadowing in determining the availability of sunlight at a proposed development site.

The guide proposes minimizing the number of dwellings whose living room face solely north unless there is some compensating factor such as an appealing view to the north, and it suggests a number of techniques to do so. Further more, it discusses massing solutions with a sensitive approach to overshadowing, so as to maximize access to sunlight.

At the same time it acknowledges that the site's existing urban environment may impose orientation or overshadowing constraints which may not be possible to overcome.

To quantify sunlight access for interiors where sunlight is expected, it refers to the BS 82606-2 criterion of Annual Probable Sunlight Hours. APSH is defined as *"the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness at the location in question."* In line with the recommendation, APSH is measured from a point on the inside face of the window, should the locations have been decided. If these are unknown, sunlight availability is checked at points 1.6m above the ground or the lowest storey level on each main window wall, and no more than 5m apart. If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken into account. If a room has two windows on opposite walls, the APSH for each can be added together.

The summary of section 3.1 of the guide states as follows:

"In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that:

At least one main window faces within 90 degrees of due south;

and

The centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March. "

In paragraph 3.1.11 the BRE guidance suggests that if a room faces significantly North of due East or West it is unlikely to meet the recommended levels proposed by the BS 8206-2. As such, it is clear that only windows facing within 90 degrees of due South can be assessed using this methodology.

It is also worth noting how paragraph 5.3 of the BS 8206-2 suggests that with regards to sunlight duration *"the degree of satisfaction is related to the expectation of sunlight if a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary"*.

3.3 OVERSHADOWING

The BRE guidance in respect of overshadowing of amenity spaces is set out in section 3.3 of the handbook. Here it states as follows:

"Sunlight in the spaces between buildings has an important impact on the overall appearance and ambiance of a development. It is valuable for a number of reasons:

- *To provide attractive sunlit views (all year)*
- *To make outdoor activities, like sitting out and children's play more pleasant (mainly during the warmer months)*
- *To encourage plant growth (mainly in spring and summer)*
- *To dry out the ground, reducing moss and slime (mainly during the colder months)*
- *To melt frost, ice and snow (in winter)*
- *To dry clothes (all year)"*

Again, it must be acknowledged that in urban areas the availability of sunlight on the ground is a factor which is significantly controlled by the existing urban fabric around the site in question and so may have very little to do with the form of the development itself. Likewise there may be many other urban design, planning and site constraints which determine and run contrary to the best form, siting and location of a proposed development in terms of availability of sun on the ground.

The summary of section 3.3 of the guide states as follows:

"3. 3 .17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March."

3.4 FURTHER RELEVANT INFORMATION

Further information can be found in The Daylight in Urban Areas Design Guide (Energy Saving Trust CE257, 2007) which provides the following recommendation with regards to VSC levels in urban areas:

"If 'theta' (Visible sky angle) is greater than 65° (obstruction angle less than 25° or VSC at least 27 percent) conventional window design will usually give reasonable results.

If 'theta' is between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15 and 27 percent), special measures such as larger windows and changes to room layout are usually needed to provide adequate daylight.

If 'theta' is between 25° and 45° (obstruction angle between 45° and 65°, VSC from 5 to 15 percent), it is very difficult to provide adequate daylight unless very large windows are used.

If 'theta' is less than 25° (obstruction angle more than 65°, VSC less than 5 percent) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed."

4 METHODOLOGY

In order to undertake the daylight and sunlight assessments set out in the previous pages, we have prepared a three dimensional computer model and used specialist lighting simulation software.

The three dimensional representation of the proposed development has been modelled using the scheme drawings provided to us by Broadway Malyan. This has been placed in the context of its surrounding buildings which have been modelled from survey information, photogrammetry, OS and site photographs. This allows for a precise model, which in turn ensures that analysis accurately represents the amount of daylight and sunlight available to the building facades, internal and external spaces, considering all of the surrounding obstructions and orientation.

4.1 SIMULATION ASSUMPTIONS

Where no values for reflectance, transmittance and maintenance factor were specified by the designer the following values from *BS 8206-2:2008, Annex A, tables A.1-A.6* were used for the calculation of Average Daylight Factor values. These values are shown in Table 1.

Table 01: Typical reflectance, transmittance and maintenance factors

REFLECTANCE VALUES:	
Surrounding	0.2
Pavement	0.2
Grass	0.1
Water	0.1
Yellow brick	0.3
Red brick	0.2
Portland Stone	0.6
Concrete	0.4
Internal walls (light grey)	0.68
Internal ceiling (white paint)	0.85
Internal floor (medium veneer)	0.3
Internal floor (light veneer)	0.4

TRANSMITTANCE VALUES	TV
Triple glazing (Low-E): Pilkington K Glass 4/12/4/12/4 Argon filled 90%	0.63
Double glazing (Low-E): Pilkington K Glass 4/16/4 Argon filled 90%	0.75
Single glazing: Pilkington Optifloat Clear 4mm Annealed	0.90
Translucent glazing (Low-E): Pilkington Optifloat Opal - 4mm K /16/4mm Opal	0.74

MAINTENANCE FACTORS: GLAZING TYPE	TV (Normal)	A.3	A.4	A.5	A.6	TV (Total)
Triple Low-E (frames modelled)	0.63	8	1	1	1	0.58
Triple Low-E (frames not modelled)	0.63	8	1	1	0.8	0.46
Triple Low-E (inclined, frames modelled)	0.63	8	2	1	1	0.53
Triple Low-E (inclined, frames not modelled)	0.63	8	2	1	0.8	0.42
Triple Low-E (horizontal, frames modelled)	0.63	8	3	1	1	0.48
Triple Low-E (horizontal, frames not modelled)	0.63	8	3	1	0.8	0.38
Double Low-E (frames modelled)	0.75	8	1	1	1	0.69
Double Low-E (frames not modelled)	0.75	8	1	1	0.8	0.55
Double Low-E (inclined, frames modelled)	0.75	8	2	1	1	0.63
Double Low-E (inclined, frames not modelled)	0.75	8	2	1	0.8	0.50
Double Low-E (horizontal, frames modelled)	0.75	8	3	1	1	0.57
Double Low-E (horizontal, frames not modelled)	0.75	8	3	1	0.8	0.46
Single (frames modelled)	0.9	8	1	1	1	0.83
Single (frames not modelled)	0.9	8	1	1	0.8	0.66
Single (inclined, frames modelled)	0.9	8	2	1	1	0.76
Single (inclined, frames not modelled)	0.9	8	2	1	0.8	0.60
Single (horizontal, frames modelled)	0.9	8	3	1	1	0.68
Single (horizontal, frames not modelled)	0.9	8	3	1	0.8	0.55
Double Translucent Low-E (frames modelled)	0.74	8	1	1	1	0.68
Double Translucent Low-E (frames not modelled)	0.74	8	1	1	0.8	0.54
Double Translucent Low-E (inclined, frames modelled)	0.74	8	2	1	1	0.62
Double Translucent Low-E (inclined, frames not modelled)	0.74	8	2	1	0.8	0.50
Double Translucent Low-E (horizontal, frames modelled)	0.74	8	3	1	1	0.56
Double Translucent Low-E (horizontal, frames not modelled)	0.74	8	3	1	0.8	0.45

5 CONCLUSIONS

Following the internal daylight and sunlight assessments undertaken by GIA in April 2013, it is now proposed that one core within Plot A is removed.

5.1 CONCLUSIONS ON THE PROPOSED DESIGN

GIA was instructed to assess the impact that this amendment would have on the daylight and sunlight amenity enjoyed within the proposed residential accommodation. To this end, the units located in this area of Plot A, which have been redesigned as a consequence of the removal of the core, have been technically analysed.

Conclusions on Daylight

The daylight quantity (expressed as Average Daylight Factor or ADF) and distribution (expressed as No Sky Line or NSL and Room Depth Criterion or RDC) have been tested within all habitable rooms subject to assessment.

The internal layouts have been designed so that living areas, where daylight is most appreciated, are generally located behind the outer facades, where the daylight availability is greatest.

In addition, the vast majority of kitchens within the proposed units have been provided with windows. Whilst this is not always sufficient to achieve the recommended daylight level, which is highest for kitchens, this is considered a significant improvement in terms of outlook and ventilation compared to the consented scheme, where a number of kitchens did not benefit from a dedicated window.

It is also worth pointing out that, where balconies have been provided in accordance with the London Housing Design Guide, they restrict the daylight ingress to the rooms below (if projecting) or behind (if inset). This represents a common trade-off of different types of amenity (daylight ingress v outdoor private amenity spaces) which occurs throughout London and is generally considered acceptable.

The results of the assessments undertaken show that 83% of the assessed rooms meet or exceed the BRE's recommendations for ADF. Of the 34 rooms seeing lower daylight levels, eight do so owing to the obstruction of a balcony, and 12 fall short of recommendation by 0.1-0.3% only.

Among the floors assessed, the upper ground floor has the lowest daylight availability as the obstruction caused by the massing opposite is greatest. This results in a number of rooms falling short of recommendation. However, the sky visibility in the living areas falling short of the recommended daylight levels is generally good.

The internal layouts, fenestration and balcony locations on the first, second and third floors are identical or very similar and so the differences in the daylight levels are due solely to the different degrees of external obstruction. This provides a clear understanding of how much the surrounding environment and the design respectively contribute to the daylight availability indoors.

On the third floor, there are just three rooms falling short of recommendation for ADF (labelled as no. 128, 132 and 134). Room no. 128 is the only instance on this floor where a living area looks into the courtyard. This room has limited daylight availability due to its outlook into the courtyard and the provision of an inset balcony which restricts the daylight ingress. Room no. 132 is a kitchen located within a flat where the main living area is well daylit, and therefore future occupants of this apartment will be able to enjoy good levels of daylight where it is most appreciated. Room no. 134 is a bedroom which falls short of the ADF recommendation by 0.2%, a marginal difference unlikely to affect the enjoyment of the space. This demonstrates that the design has been developed to provide good daylight amenity within the majority of proposed habitable rooms.

On the second floor, in addition to the rooms discussed above for the third floor, three more rooms see levels of ADF below those recommended. Two of these (rooms no. 66 and 95) fall short of the suggested ADF levels by 0.1%, which as explained above is a small difference unlikely to be detrimental to the enjoyment of the space. Room no. 74 is a kitchen which achieves 1.4% ADF and 100% NSL, thus falling marginally short of the daylight level recommended for living areas but offering excellent sky visibility.

On the first floor, there are two more rooms seeing ADF lower than those suggested, in addition to those discussed above. These are kitchens which exceed the minimum recommendation for living areas and therefore still offer access to good levels of daylight.

On the fourth, fifth and sixth floors, where the internal layouts are different to the lower floors, only one room on each floor falls short of the ADF recommendation. These rooms (no. 155, 175 and 187) are kitchens located behind inset balconies which, as explained above, restrict the sky visibility from within the rooms. Good daylight levels will be enjoyed within the bedroom and living room in the same units.

The levels of sky visibility are in line with guidance in the majority of rooms, with the rooms falling short of the NSL recommendation looking into the courtyard as is typical of of this type of arrangements.

All rooms in the new configuration with the exception of one have been designed in accordance with the RDC where this is applicable.

Overall, the proposed residential accommodation is considered to offer acceptable daylight levels for a courtyard scheme located within a dense urban environment.

Conclusions on Sunlight

BRE states that sunlight is most appreciated in living areas and the greatest expectation of sunlight is in south-facing rooms, therefore an assessment of Annual Probable Sunlight Hours has been undertaken on all living areas with a southerly aspect.

The results demonstrate that all assessed living areas located behind the southern facade will enjoy good sunlight levels both over the entire year and during the winter months, with at least one window in each room exceeding the recommended sunlight levels.

Lower sunlight levels are typically seen in courtyards. In order to maximise the sunlight ingress, the living areas in this location have been provided with windows flush with the facade. As a result, all living areas to the north receive good sunlight levels over the entire year. Those to the south receive lower levels of sunlight as the massing to the south acts as an obstruction. In winter, when the sun is lower in the sky, less sunlight will reach the courtyard. Such results are typical of courtyard arrangements, where the low-angle winter sun is intercepted by the massing to the south.

5.2 COMPARISON WITH THE CONSENTED SCHEME

Although the internal layouts have been redesigned as a consequence of the removal of one core, the rooms' proportions, fenestration and balconies have generally been altered only slightly and therefore the daylight availability indoors is not expected to change significantly.

Overall therefore, the proposed removal of one core is not considered to materially affect the daylight amenity within the proposed residential accommodation, which is still considered acceptable.

6 INTERNAL DAYLIGHT ASSESSMENTS

Upper Ground Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - UPPER GROUND FLOOR				
7	Living Room	1	79	MET
8	Living Room	1.6	98	N/A
9	Kitchen	0.9	82	MET
10	Bedroom	2.4	100	MET
11	Living Room	1.9	98	NOT MET
12	Bedroom	1.7	100	MET
13	Studio	1.5	100	MET
14	L/K/D	1.9	99	MET
15	Bedroom	1.5	99	MET
16	Living Room	1.3	100	MET
17	Bedroom	1.2	87	MET
18	Bedroom	1.4	87	MET
19	Bedroom	0.5	24	MET
20	Bedroom	0.8	33	MET
21	Bedroom	0.8	24	MET
22	Bedroom	1	34	MET
23	Bedroom	0.7	24	MET
24	Bedroom	0.9	29	MET
25	Bedroom	0.2	9	MET
26	Bedroom	0.8	26	MET
27	Bedroom	0.6	19	MET
28	Bedroom	0.6	24	MET

Table 02: Assessment Data

Fig. 01: Floor Plan

First Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - FIRST FLOOR				
29	Living Room	2.3	88	MET
30	Bedroom	0.7	70	MET
31	Bedroom	2.7	100	N/A
32	Living Room	1.5	64	MET
33	Kitchen	2.8	99	MET
34	Kitchen	1.7	83	N/A
35	Living Room	1.9	75	N/A
36	Bedroom	2.7	98	MET
37	Bedroom	2.2	98	MET
38	Kitchen	1.2	81	N/A
39	Living Room	1.6	77	N/A
40	Bedroom	2.3	95	MET
41	Bedroom	3	100	MET
42	Bedroom	4.2	100	N/A
43	Living Room	2.5	100	N/A
44	Kitchen	3.3	99	N/A
45	Bedroom	2.2	99	MET
46	L/K/D	3.1	100	MET
47	Studio	3.6	99	MET
48	L/K/D	2.4	100	MET
49	Bedroom	1.6	84	MET
50	Bedroom	1.8	81	MET
51	Bedroom	2.3	80	MET
52	Bedroom	2.1	72	MET
53	Bedroom	1.6	72	MET
54	Bedroom	1.6	48	MET
55	Kitchen	1.8	46	MET
56	Living Room	0.7	16	MET
57	Bedroom	2.6	60	MET
58	Bedroom	1.8	40	MET
59	Living Room	1.3	28	MET
60	Kitchen	0.6	0	MET
61	Bedroom	1.2	24	MET
62	Bedroom	0.6	23	MET
63	Bedroom	1.5	41	MET
64	Bedroom	1.3	29	MET

Table 03: Assessment Data

Fig. 02: Floor Plan

Second Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - SECOND FLOOR				
65	Living Room	2.6	100	MET
66	Bedroom	0.9	75	MET
67	Bedroom	3.1	100	N/A
68	Living Room	1.6	84	MET
69	Kitchen	3.2	100	MET
70	Kitchen	2.1	100	MET
71	Living Room	2.1	93	N/A
72	Bedroom	3.1	98	MET
73	Bedroom	2.5	98	MET
74	Kitchen	1.4	100	MET
75	Living Room	1.8	94	N/A
76	Bedroom	2.6	99	MET
77	Bedroom	3.3	100	MET
78	Bedroom	4.3	100	N/A
79	Living Room	2.4	100	MET
80	Kitchen	3.3	99	MET
81	Bedroom	2.3	99	MET
82	L/K/D	3.1	100	MET
83	Studio	3.4	99	MET
84	L/K/D	2.3	100	MET
85	Bedroom	1.8	87	MET
86	Bedroom	2	87	MET
87	Bedroom	2.6	84	MET
88	Bedroom	2.4	77	MET
89	Bedroom	1.8	75	MET
90	Bedroom	1.7	56	MET
91	Kitchen	2	57	MET
92	Living Room	0.8	22	MET
93	Bedroom	2.8	75	MET
94	Bedroom	2.1	51	MET
95	Living Room	1.4	33	MET
96	Kitchen	0.7	0	MET
97	Bedroom	1.4	30	MET
98	Bedroom	0.7	29	MET
99	Bedroom	1.7	49	MET
100	Bedroom	1.6	35	MET

Table 04: Assessment Data

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Fig. 03: Floor Plan

Third Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - THIRD FLOOR				
101	Living Room	2.9	100	MET
102	Bedroom	1.8	93	MET
103	Bedroom	3	100	MET
104	Living Room	2	99	N/A
105	Kitchen	3.8	100	MET
106	Kitchen	2.7	100	N/A
107	Living Room	2.1	100	N/A
108	Bedroom	4.1	99	MET
109	Bedroom	2.9	98	MET
110	Kitchen	2.7	100	N/A
111	Living Room	2	100	N/A
112	Bedroom	2.7	100	MET
113	Bedroom	3.3	99	MET
114	Bedroom	4.6	100	N/A
115	Living Room	3.7	100	N/A
116	Kitchen	3.8	99	MET
117	Bedroom	2.4	99	MET
118	L/K/D	3.3	100	MET
119	Studio	3.5	99	MET
120	L/K/D	2.6	100	MET
121	Bedroom	2	91	MET
122	Bedroom	2.3	93	MET
123	Bedroom	2.8	90	MET
124	Bedroom	2.7	85	MET
125	Bedroom	2	80	MET
126	Bedroom	2	76	MET
127	Kitchen	2.2	72	MET
128	Living Room	0.9	37	MET
129	Bedroom	3.3	91	MET
130	Bedroom	2.4	68	MET
131	Living Room	1.6	42	MET
132	Kitchen	0.8	7	MET
133	Bedroom	1.6	39	MET
134	Bedroom	0.8	38	MET
135	Bedroom	2	61	MET
136	Bedroom	1.8	43	MET

Table 05: Assessment Data

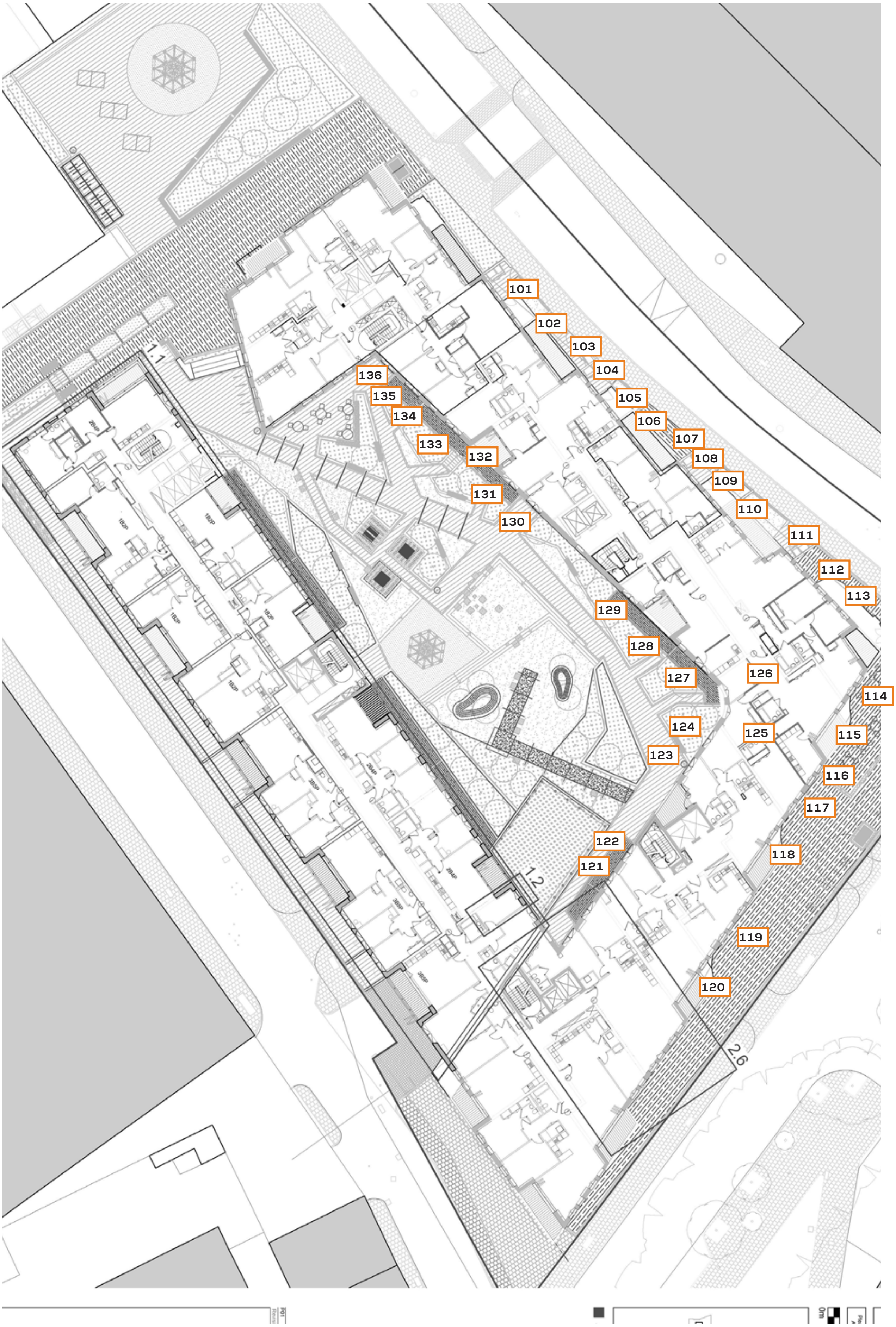

Fig. 04: Floor Plan

Fourth Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - FOURTH FLOOR				
137	Living Room	3.1	99	MET
138	Bedroom	1.9	93	MET
139	Bedroom	3.4	100	MET
140	Living Room	2.2	100	N/A
141	Kitchen	4	100	MET
142	Kitchen	2.9	100	MET
143	Living Room	2.5	100	N/A
144	Bedroom	3.2	99	MET
145	Bedroom	2.6	98	MET
146	L/K/D	4.1	100	N/A
147	Bedroom	4.1	100	MET
148	L/K/D	3	99	MET
149	Bedroom	2.3	100	MET
150	Bedroom	2.4	99	MET
151	Bedroom	2.8	98	MET
152	Bedroom	2.9	99	MET
153	Bedroom	3.1	98	MET
154	Living Room	1.7	54	MET
155	Kitchen	0.9	27	MET
156	Bedroom	2	55	MET
157	Bedroom	1	53	MET
158	Bedroom	2.3	78	MET
159	Bedroom	2.1	55	MET

Table 06: Assessment Data

Fig. 05: Floor Plan

Fifth Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - FIFTH FLOOR				
160	Living Room	3.3	100	MET
161	Bedroom	2.1	93	MET
162	Bedroom	3.5	100	MET
163	Living Room	2.3	100	MET
164	Kitchen	4.2	100	MET
165	Kitchen	3.4	100	MET
166	Living Room	3.9	100	MET
167	Bedroom	5.3	100	N/A
168	Bedroom	3	99	MET
169	Bedroom	3	100	MET
170	Bedroom	6	100	N/A
171	L/K/D	3.5	99	N/A
172	Bedroom	5	100	N/A
173	Bedroom	4.1	100	MET
174	Living Room	2.1	79	MET
175	Kitchen	1.2	66	MET
176	Bedroom	2.2	78	MET
177	Bedroom	1.4	84	MET
178	Bedroom	2.8	96	MET
179	Bedroom	2.4	70	MET

Table 07: Assessment Data

Fig. 06: Floor Plan

Sixth Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC
P1 - SIXTH FLOOR				
180	Living Room	3.5	99	MET
181	Bedroom	2.4	93	MET
182	Bedroom	6.3	100	MET
183	Living Room	2.7	100	MET
184	Kitchen	9.3	100	MET
185	Bedroom	4.7	100	MET
186	Living Room	2.2	98	MET
187	Kitchen	1.4	99	MET
188	Bedroom	2.5	93	MET
189	Bedroom	1.5	94	MET
190	Bedroom	3.2	100	MET
191	Bedroom	2.7	88	MET

Table 08: Assessment Data